

CLAIMS

We claim:

1. A Faraday rotator device comprising:
 - a) magneto-optic material; and,
 - b) two semi-hard magnet cores located in proximity to said magneto-optic material such that the magneto-optic material is affected by the magnetic field of the semi-hard magnet cores.
 - c) Two soft-magnet tubes located in proximity to said semi-hard magnet cores such that a continuous magnetic flux path from the soft magnet tube to semi-hard magnet core can be built up.
 - d) a coil encompassing said magneto-optic material, said semi-hard magnet cores, and said soft magnet tubes such that current passing through said coil generates a magnetic field at the location of said magneto-optic material, said soft magnet tubes and semi-hard magnet cores.
2. A device as in claim 1 further comprising a soft magnetic adaptor such that said adaptor, said soft magnet tube, and said semi-hard magnet core form a continuous magnetic flux loop.
3. A device as in claim 1 wherein the coercivity of said semi-hard magnet core is in the range from approximately 10 Oersteds to approximately 100 Oersteds.
4. A device as in claim 1 wherein said semi-hard magnet core is in circular ring shape and said circular ring has the following geometrical characteristics: D_i/D_o is in the range from 0.6 to 0.7 and L/D_o is in the range of 0.2 to 0.4, where D_i is the inner diameter of said circular ring, D_o is the outer diameter of said circular ring, and L is the length of said circular ring.
5. A device as in claim 1 wherein said semi-hard magnet core is in polygonal ring shape and said polygonal ring has the following geometrical characteristics: the number of sides of said polygonal ring is in the range from 3 to 12, and L/D_o is in the range of 0.2 to 0.4, where D_o is the outer diameter of said circular ring, and L is the length of said circular ring.

6. A device as in claim 1 wherein the wire gauge of said magnet wire coil is in the range from 38 AWG to 44AWG.
7. A device as in claim 6 wherein the length of said magnet wire coil is in the range from $0.8 \cdot D_o$ to $1.5 \cdot D_o$, where D_o is the outer diameter of said wire coil.
8. A device as in claim 6 wherein the resistance of said wire coil is in the range from 50 Ohm to 150 Ohm.